

### REMARKS

The Official Action mailed July 13, 2007 has been carefully considered. Claims 6, 7 and 9 through 16 are pending in the present application and stand rejected. Claims 6, 7 and 11 have been amended and claims 8-10 have been cancelled. Reconsideration and allowance of the subject application, as amended, are respectfully requested.

#### Claim Amendments

Claim 6 has been amended to recite: "providing an atomized iron based metallic coating alloy." Support for this amendment may be found in paragraph [0018] of the published application, which recites "a high velocity oxy-fuel sprayed coating was provided to a substrate using an atomized powder." No new matter has been entered by this amendment.

Claim 6 has also been amended to recite: "forming a metallic coating by high velocity oxy-fuel spray." Support for this amendment may be found in the above recited portion of paragraph [0018]. No new matter has been entered by this amendment.

Claim 6 has also been further amended to recite: "an ASTM C633 bond strength of at least about 12,000 psi." Support may be found in Table I, as well as paragraph [0021], which recites in part: "the magnitude of the bond strength of the high velocity oxy-fuel coatings (12,000 to >14, 000 psi) is exceptional for metallic coatings." No new matter has been entered by this amendment.

Claim 11 has been similarly amended.

#### Rejections under 35 USC §103

Claims 6-7 and 9-16 stand rejected under 35 USC §103(a) as being obvious over Dardi et al., U.S. 4, 615,864 (Dardi) in view of Dickson, et al., U.S. 4,381,943 (Dickson).

As an initial matter, Applicants note the amendments to claims 6 and 11, which reflect providing an atomized iron based metallic coating alloy, forming a metallic coating by high velocity oxy-fuel spray and that the iron based metallic coating has an ASTM C633 bond strength of at least about 12,000 psi.

It is respectfully asserted that Dardi in view of Dickson, fail to render obvious the presently claimed subject matter. More specifically, Dardi is relied upon to teach “a process for coating iron-based alloys using a metallic coating alloy composition comprising 10-50% Cr, 0.1 to 10 % Mn, up to 5% of La, up to 10% Hf, up to 5% Ti, up to 12 % Si and balanced with Fe” and “that its metallic coating is applied by plasma spraying.” *Office Action* of July 13, 2007, page 3. It is recognized, however, that “Dardi does not teach that its metallic coating alloy comprises the claimed boron.” *Id.* Accordingly, the *Office Action* refers to Dickson for “adding B to iron based metal alloys to create a chemically homogenous and microcrystalline material for coating substrates” and that “this metal alloy will produce a substantially amorphous coating.” *Id.*

However, the Applicants note that neither Dardi nor Dickson disclose a method of forming a metallic coating by high velocity oxy-fuel spray. Dardi specifies that “[t]he utilization of plasma spray techniques to deposit the coating compositions is preferred” and also refers to the use of “physical vapor deposition or ion plating, as well as sputtering or slurry sintering.” Col. 6, lines 3-18. Dickson discloses arc plasma spraying for preparing the powders contemplated therein. See Col. 3, lines 24-28. Accordingly, neither reference discloses the use of high velocity oxy-fuel spray nor would render obvious the use of such process to apply the iron based metallic coating alloy.

In addition, claim 7 has been amended to recite that “wherein said step of melting said iron based alloy to a liquid state comprises forming a liquid state with no precipitates of said deoxidizing elements existing in said liquid state.” It is submitted that Dardi in combination with Dickson, however, fail to render obvious amended claim 7.

In the *Office Action* of July 13, 2007 on page 4, it was stated that “Dardi in view of Dickson do not teach the presence of precipitates in the liquid state of the coating alloy used for plasma spray coating, the examiner construes that the precipitates is not present in the molten coating alloy of Dardi in view of Dickson based upon the broadest interpretation.” This argument is not fully understood. That is, Dardi appears silent, and as noted below, it is believed

that Dickson instructs that when boron is present in an atomized powder, precipitates will be formed.<sup>1</sup>

Specifically, Dickson recognizes and teaches that B is a strong precipitation former and that “if atomized powders are employed, the powders will have at least two phases, a metallic solid solution and a boride” and that “[t]he boride appears to survive the remelting associated with arc plasma spraying.” See Col. 1, lines 39-42 and Col. 2, lines 62-68. Thus, to obtain a “substantially amorphous coating” Dickson teaches that “[i]n order to assure that the powders have a chemically homogeneous microcrystalline structure, it is preferable that the cooling rate be at least about  $10^5$  °C/sec during the solidification of the molten metal” and that “[t]his cooling rate is not generally obtainable by atomization techniques.” Col. 2, line 58-62. Accordingly, Dickson teaches against the use of atomized powders for B containing alloys as the powders will contain precipitates and even when arc plasma sprayed the precipitates remain.

However, presently amended, dependent claim 7 recites that with respect to boron containing alloy, wherein boron is included as an oxygen seeking nonmetal/metalloid (see independent claim 6) “melting said iron based alloy to a liquid state comprises forming a liquid state with no precipitates of the deoxidized elements existing in said liquid state.” Accordingly, Dickson fails to render obvious the use of an atomized iron based metallic coating alloy, wherein melting said iron based alloy to a liquid state comprises forming a liquid state with no precipitates of the deoxidized elements existing in said liquid state.

Therefore, it is respectfully submitted that the presently claimed subject matter defines over the references cited. Having dealt with all the objections raised by the Examiner, it is respectfully submitted that the present application, as amended, is in condition for allowance. Thus, early allowance is earnestly solicited.

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<sup>1</sup> It is respectfully submitted that if a reference is silent as to a certain feature of its state of matter (i.e. whether there may be a precipitate of a particular element in the liquid state) it is not a reasonable basis to conclude that such liquid state is free of precipitates. Applicant request the Examiner to consider this in context, such as the situation when an applicant seeks to add a negative limitation to a claim with respect to a specification that is silent as to such feature, in which case the negative limitation is generally not assumed to be disclosed and supported. Furthermore, as noted above, Dickson, which is relied upon in combination with Dardi, teaches that if boron is present in an atomized powder, precipitates will be formed, which is inapposite to claim 7.

**AMENDMENT**

Serial Number: 10/776,472

Filing Date: February 11, 2004

Title: Highly Active Liquid Melts Used to Form Coatings

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Docket: NANO004U

**CONCLUSION**

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

In the event there are any fees due, please charge them to our Deposit Account No. 50-2121 in order to maintain pendency of the subject application.

Respectfully submitted,

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